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INFRARED & OPTICS DIVISION

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National Aeronautics & Space Administration
Johnson Space Center
Principal Investigator Management Office
Houston, Texas 77058

Attention: Mr. Tim White/TF6
Contract: NAS9-13317
Subject: First Quarterly Report for Period 8 March 1973
through 8 June 1973

Dear Sir:

The following report serves as the first quarterly report for this contract, which is entitled "Mapping Exposed Silicate Rock Types and Exposed Ferric and Ferrous Compounds from a Space Platform." The financial report was submitted under a separate cover.

The progress this quarter was limited to a study of the newly received "EREP Investigator's Information Book", development of a data analysis plan (contingent upon the actual experimental conditions of the EREP data collection), and design of a computer program which will convert laboratory data into a form useful for feature selection and interpretation of Skylab data.

The first task undertaken was preparation for the use of existing laboratory data in the NASA Earth Resources Spectral Information System (ERSIS) to help select the best spectral channels of EREP to achieve the geological objectives stated above, and to determine how the selected ratios can be linearly combined to produce a single parameter that can be used for rock-type identification. Writing on a software program called SRAGAL (Skylab Ratio Gating Logic) was begun to accomplish this task. The function of SRAGAL is to calculate reflectances of pairs of spectral regions corresponding to user-selected spectral channels of the EREP S192 scanner. The data from n ratios for each spectral curve of interest will be compressed into an n-digit number to ease the handling of large amounts of data. There are approximately 500 spectral curves from ERSIS which will form the data base for SRAGAL. This subset of curves was chosen on the basis of two criteria: the curves extend in wavelength all the way from 0.4 μ m to 2.5 μ m and they include only small amounts of vegetation (all crops are excluded). Only about six to ten of the EREP scanner channels and only about 11 of the many possible non-redundant ratios which could be formed from these channels will be selected (on the basis of physical knowledge of geologic materials) for calculation, which will keep the amount of information

E73-10877) MAPPING EXPOSED SILICATE ROCK
TYPES AND EXPOSED FERRIC AND FERROUS
COMPOUNDS FROM A SPACE PLATFORM
Quarterly (Environmental Research Inst. of
Michigan) 2 p HC \$3.00

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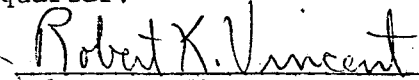
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from getting too large for analysis. Physical judgment will be used to select the original set of ratios, but only quantitative analysis will be used to reduce the number of ratios further. Calculated ratios will be available for the next quarterly report.

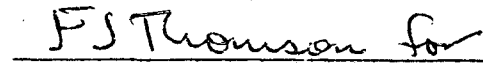
The SRAGAL program is similar to an ARAGAL (Aircraft Ratio Gating Logic) program that has been written for a NASA SR&T contract for the ERIM M-7 aircraft scanner, instead of the EREP scanner. A subroutine for ARAGAL, initiated to permit searching of tape outputs of ARAGAL for different ranges of each ratio digit, will be used for SRAGAL also. This subroutine will use ratio gating logic on each digit of the n-digit ratio number to permit searches of the 500-curve data set for all spectral curves falling into ratio ranges specified by the user. For instance, the user can find the ratio ranges corresponding to several samples of a given mineral, such as hematite, and search the 500 curves for all other materials that "look" like hematite. In this sense, SRAGAL can be used for indicating prior to data processing what rock types can probably be discriminated and what ratios will be the best discriminators (feature selection), to the extent that ERSIS contains the number and kind of rock spectra required to make such a judgment.

During the next reporting period, SRAGAL results will be completed, preparations for S191 data will be made, and S191 and S192 data will be screened. No travel has been done or is expected during the next reporting period. No significant results were produced during the first quarter.

Submitted by:


Robert K. Vincent
Principal Investigator

Approved by:


Richard R. Legault, Director
Infrared & Optics Division

RKV:rmc